DRINKING WATER SURVEILLANCE PROGRAM

WALPOLE ISLAND WATER TREATMENT PLANT

REPORT FOR 1991 AND 1992

Ontario

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DRINKING WATER SURVEILLANCE PROGRAM

REPORT FOR 1991 AND 1992

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

WALPOLE ISLAND WATER TREATMENT PLANT
1991 AND 1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The Walpole Island water treatment plant is a package plant which uses conventional treatment and treats water from St. Clair River. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. Powder activated carbon is added on a continuous basis for taste and odour control and for removal of organics. This plant has a rated capacity of 0.87 x 1000 m^3/day. The Walpole Island water treatment plant serves a population of approximately 1,900.

Water at the plant was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Walpole Island water treatment plant, for the sample years 1991 and 1992, produced good quality water. Water from the distribution system was not sampled.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE
BACTERIOLOGICAL	3	3	100	6	0	0
CHEMISTRY (FIELD)	35	35	100	69	69	100
CHEMISTRY (LABORATORY)	282	233	82	284	206	72
METALS	265	71	26	265	60	22
CHLOROAROMATICS	140	0	0	126	0	0
CHLOROPHENOLS	12	0	0	18	0	0
PESTICIDES AND PCB	363	0	0	339	0	0
PHENOLICS	12	0	0	12	0	0
POLYAROMATIC HYDROCARBONS	85	0	0	68	0	0
SPECIFIC PESTICIDES	54	0	0	67	0	0
VOLATILES	358	0	0	358	48	13
RADIONUCLIDES	21	4	19	21	4	19
TOTAL	1,630	346		1,633	387	

DRINKING WATER SURVEILLANCE PROGRAM

WALPOLE ISLAND WATER TREATMENT PLANT
1991 AND 1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Walpole Island water treatment plant in the spring of 1985 as part of a survey of the St.Clair /Detroit River area. Previous DWSP annual reports have been published for 1986, 1987, 1988, 1989 and 1990.

PLANT DESCRIPTION

The Walpole Island water treatment plant is a package plant which uses conventional treatment and treats water from St. Clair River. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. Powder activated carbon is added on a continuous basis for taste and odour control and for removal of organics. This plant has a rated capacity of 0.87 x 1000 m^3/day. The Walpole Island water treatment plant serves a population of approximately 1,900.

The sample day flows ranged from 0.39 x 1000 m^3/day to 0.56 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

To obtain a representative raw water sample, free from any added chemicals, at plants which used chlorine for zebra mussel control, the operator was required to turn off the chlorine feed to the mouth of the intake and allow enough time for the chlorinated water to clear from the intake works.

Plant operating personnel routinely analyzed parameters for process control (Table 2).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling. No distribution samples were taken during this sample period.

Water at the plant was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between the raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative sample results is given. In contrast, if a parameter was detected at any location, the detailed results for all samples are provided.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:
-THE TREATED AND DISTRIBUTED WATER;
-ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND
-POSITIVE ORGANIC PARAMETERS DETECTED.

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A

temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of delivered water may increase in the distribution system due to the warming effect of soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Aesthetic Objective of 15°C in 3 of 11 treated water samples with a maximum reported value of 22.2°C.

CHEMISTRY (LABORATORY)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Recommended Operational Guideline of 80-100 mg/L in 10 of 12 treated water samples with a maximum reported value of 114.0 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to measure the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant to avoid problems in the distribution system.

Aluminum exceeded the ODWO Recommended Operational Guideline of 100 ug/L in 6 of 11 treated water samples with a maximum reported value of 220 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that one was detected at a trace level.

PESTICIDES AND PCB

The results of the pesticide and PCB scan showed that none were detected above trace levels.

PHENOLICS

The results of the phenolic test showed that none were detected above trace levels.

POLYAROMATIC HYDROCARBONS

The results of the polyaromatic hydrocarbon scan showed that none were detected.

SPECIFIC PESTICIDES

The results of the specific pesticide scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Toluene was found at a positive level in 1 of the 12 treated and distributed water samples analyzed. The maximum observed level was 0.55 ug/L. This was below the ODWO Aesthetic Objective of 24 ug/L.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provided a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in all 12 treated and distributed water samples analyzed with a maximum level of 56.5 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

RADIOLOGICAL

RADIONUCLIDES

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclides currently of greater interest from a health view-point are tritium, strontium-90, iodine-131, cesium-137 and radium-226. The gross beta and gross alpha determinations are suitable for preliminary screening except for tritium which must be measured separately. Radionuclides are measured in becquerels per litre (Bq/L). No results were above the available guidelines.

CONCLUSIONS

No known health related guidelines were exceeded.

The Walpole Island water treatment plant, for the sample years 1991 and 1992, produced good quality water. Water from the distribution system was not sampled.

FIGURE 1

WALPOLE ISLAND WATER TREATMENT PLANT

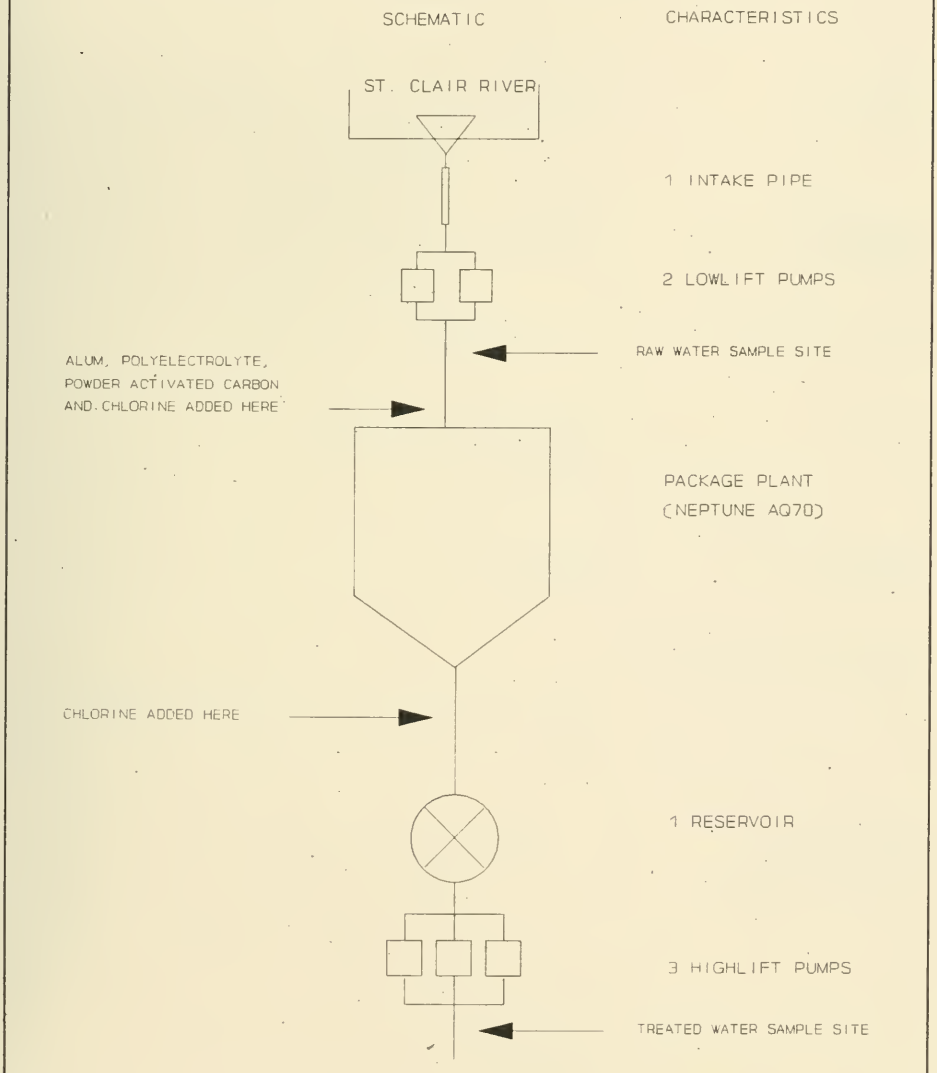

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

PLANT NAME:	WALPOLE ISLAND WTP
WORKS #:	230000129
UTM #:	173755504718525
DISTRICT:	SARNIA
REGION:	SOUTHWEST
DISTRICT OFFICER:	O. WIGLE
SUPERINTENDENT:	S. KICKNOSWAY
ADDRESS:	RR # 3 WALLACEBURG, ONTARIO N8A 4K9 519-627-1426
MUNICIPALITY:	WALLACEBURG
AUTHORITY:	FEDERAL

PLANT INFORMATION

PLANT VOLUME:	.829	(X 1000 M3)
DESIGN CAPACITY:	2.511	(X 1000 M3/DAY)
RATED CAPACITY:	.878	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
WALPOLE RESERVE	1,900

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
FREE CHLORINE RESIDUAL	LAB RAW	2 TIMES/DAY
	LAB TREATED	2 TIMES/DAY
TOTAL CHLORINE RESIDUAL	LAB SETTLED	2 TIMES/DAY
	LAB TREATED	2 TIMES/DAY
PH	LAB RAW	WEEKLY
	LAB TREATED	WEEKLY
TURBIDITY	LAB RAW	2 TIMES/DAY
	LAB SETTLED	2 TIMES/DAY
	LAB TREATED	2 TIMES/DAY

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM WALPOLE ISLAND WTP SAMPLE DAY CONDITIONS
AND TREATMENT CHEMICAL DOSAGES FOR 1991 AND 1992

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	COAGULATION ALUM DRY	TASTE AND ODOUR ACTIVATED CARBON POWDER	COAGULATION AID POLYELECTROLYTE	PRE CHLORINATION CHLORINE
91 JAN 08	41.00	.485	7.00	10.00	.10	1.00
91 MAR 05	36.35	.547	20.00	10.00	.10	.50
91 MAY 07	43.00	.461	10.00	10.00	.10	.50
91 JUL 02	47.12	.527	7.00	10.00	.10	.50
91 SEP 03	44.50	.444	12.50	10.00	.10	1.00
91 NOV 05	53.00	.562	10.00	10.00	.10	.60
92 JAN 07	44.78	.444	9.00	10.00	.10	.60
92 MAR 10	43.00	.460	7.00	10.00	.10	1.00
92 MAY 06	50.50	.393	6.50	4.50	.10	.70
92 JUL 08	39.85	.499	7.50	9.00	.10	.90
92 SEP 11	43.20	.459	7.50	9.00	.10	1.00
92 NOV 04	45.40	.438	9.50	9.00	.10	1.00

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

KEY TO TABLE 4 and 5

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
- 1. Maximum Acceptable Concentration (MAC)
- 1+. MAC for Total Trihalomethanes
- 2. Interim Maximum Acceptable Concentration (IMAC)
- 3. Aesthetic Objective (AO)
- 3*. AO for Total Xylenes
- 4. Recommended Operational Guideline
- 5. Health Related Guidance Value

B HEALTH & WELFARE CANADA (H&W)
- 1. Maximum Acceptable Concentration (MAC)
- 2. Proposed MAC
- 3. Interim MAC
- 4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
- 1. Guideline Value (GV)
- 2. Tentative GV
- 3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
- 1. Maximum Contaminant Level (MCL)
- 2. Suggested No-Adverse Effect Level (SNAEL)
- 3. Lifetime Health Advisory
- 4. EPA Ambient Water Quality Criteria

F EUROPEAN ECONOMIC COMMUNITY (EEC)
- 1. Health Related Guideline Level
- 2. Aesthetic Guideline Level
- 3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!48	No Data: Sample Age Exceeded 48 Hours
!AR	No Data: No Numeric Results
!AW	No Data: Analysis Withdrawn
!BT	No Data: Sample Broken In Transit
!CS	No Data: Contamination Suspected
!EF	No Data: Laboratory Equipment Failure
!IR	No Data: Insufficient Sample
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedure Error: Sample Discarded
!PR	No Data: Preservative Required
!QU	No Data: Quality Control Unacceptable
!RE	No Data: Received Empty
!RO	No Data: No Numeric Results
!SM	No Data: Sample Missing
!SS	No Data: Sample Improperly Preserved
!U	No Data: Sample Unsuitable For Analysis
!UB	No Data: Bottle Broken
!UN	No Data: Result Unreliable

!UR	No Data: Unpreserved Sample Required
A	Approximate Value
A3C	Approximate, Total Count Exceeded 300 Colonies
A>	Approximate Value, Exceeded Normal Range
APS	Additional Peak, Less Than, Not Priority Pollutant
ARO	Additional Information In Laboratory Report
CRO	Calculated Result Only
NAF	Not All Required Tests Found
RID	Ioncal Calculated on Incomplete Data Set
RMP	P and M-Xylene Not Separated
RRR	Result Obtained by Repeat Analysis
RRV	Rerun Verification
SFA	Sample Filtered: Filtrate Analyzed
SIL	Sample Incorrectly Labelled
SPS	Several Peaks, Small, Not Priority Pollutant
U48	Unreliable: Sample Age Exceeded 48 Hours
UAL	Unreliable: Sample Age Exceeded Limit
UAU	Unreliable: Sample Age Unknown
UCS	Unreliable: Contamination Suspected
WSD	Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
BACTERIOLOGICAL				
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)
1991 SEP	126	.		
STANDRD PLATE CNT MF (CT/ML)			DET'N LIMIT = 0	GUIDELINE = 500 (A3)
1991 SEP	.	2 <=>		
1991 NOV	.	0 <=>		
1992 JAN	.	2 <=>		
1992 MAR	.	1 <=>		
1992 MAY	.	0 <=>		
1992 NOV	.	3 <=>		
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML (A1)
1991 SEP	1300 A3C	.		
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A
1991 SEP	49000 A3C	.		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
CHEMISTRY (FIELD)		
FLD CHLORINE (COMB) (MG/L)	**DET'N LIMIT = 0**	**GUIDELINE = N/A**
1991 JAN	.	.100
1991 MAR	.	.100
1991 MAY	.	.200
1991 JUL	.	.100
1991 SEP	.	.100
1991 NOV	.	1.100
1992 JAN	.	.020
1992 MAR	.	.100
1992 MAY	.	.900
1992 SEP	.	.100
1992 NOV	.	.100
FLD CHLORINE FREE (MG/L)	**DET'N LIMIT = 0**	**GUIDELINE = N/A**
1991 JAN	.	.900
1991 MAR	.	1.000
1991 MAY	.	.800
1991 JUL	.	.400
1991 SEP	.	1.000
1991 NOV	.	.900
1992 JAN	.	.070
1992 MAR	.	1.000
1992 MAY	.	.700
1992 JUL	.	.700
1992 SEP	.	1.000
1992 NOV	.	1.000
FLD CHLORINE (TOTAL) (MG/L)	**DET'N LIMIT = 0**	**GUIDELINE = N/A**
1991 JAN	.	1.000
1991 MAR	.	1.100
1991 MAY	.	1.000
1991 JUL	.	.500
1991 SEP	.	1.100
1991 NOV	.	2.000
1992 JAN	.	.090
1992 MAR	.	1.100
1992 MAY	.	1.600
1992 JUL	.	.900
1992 SEP	.	1.100
1992 NOV	.	1.100

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
CHEMISTRY (FIELD)		
FLD PH (DMNSLESS)	DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5 (A4)
1991 JAN	8.200	7.200
1991 MAR	7.600	7.100
1991 MAY	8.300	
1991 JUL	7.400	7.600
1991 SEP	8.500	7.600
1991 NOV	8.300	7.600
1992 JAN	7.900	8.000
1992 MAR	8.200	7.600
1992 MAY	8.200	7.600
1992 JUL	8.400	8.400
1992 SEP	8.400	7.600
1992 NOV	8.300	7.700
FLD TEMPERATURE (DEG.C)	DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
1991 JAN	2.000	2.700
1991 MAR	1.500	1.200
1991 MAY	8.000	8.500
1991 JUL	20.500	21.000
1991 SEP	20.500	22.200
1991 NOV	10.000	11.500
1992 JAN	3.500	4.000
1992 MAR	2.000	3.000
1992 MAY	7.000	7.000
1992 JUL	17.000	17.500
1992 NOV	10.000	10.200
FLD TURBIDITY (FTU)	DET'N LIMIT = N/A	GUIDELINE = 1.0 (A1)
1991 JAN	1.500	.150
1991 MAR	46.000	.320
1991 MAY	8.000	.160
1991 JUL	3.100	.120
1991 SEP	11.600	.500
1991 NOV	3.000	.170
1992 JAN	3.500	.140
1992 MAR	4.300	.260
1992 MAY	2.900	.120
1992 JUL	.700	.800
1992 SEP	1.600	.050
1992 NOV	2.800	.090

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
CHEMISTRY (LABORATORY)				
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)
1991 JAN	83.700	77.400		
1991 MAR	90.900	78.300		
1991 MAY	85.800	77.600		
1991 JUL	86.500	80.200		
1991 SEP	87.900	80.400		
1991 NOV	84.300	77.400		
1992 JAN	83.800	76.000		
1992 MAR	84.400	78.900		
1992 MAY	84.400	78.700		
1992 JUL	85.200	80.400		
1992 SEP	83.800	79.700		
1992 NOV	85.900	80.800		
CALCIUM (MG/L)			DET'N LIMIT = 0.20	GUIDELINE = 100 (F2)
1991 JAN	28.800	29.600		
1991 MAR	32.000	32.200		
1991 MAY	28.700	28.600		
1991 JUL	29.400	30.000		
1991 SEP	28.400	29.300		
1991 NOV	27.400	27.500		
1992 JAN	27.000	27.500		
1992 MAR	28.800	28.700		
1992 MAY	28.200	28.750		
1992 JUL	28.300	28.300		
1992 SEP	27.700	28.400		
1992 NOV	28.500	29.050		
CYANIDE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 0.2 (A1)
18 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
CHEMISTRY (LABORATORY)		
CHLORIDE (MG/L)	**DET'N LIMIT = 0.20**	**GUIDELINE = 250 (A3)**
1991 JAN	9.300	10.300
1991 MAR	10.300	11.000
1991 MAY	8.400	9.900
1991 JUL	9.400	10.000
1991 SEP	9.100	9.400
1991 NOV	8.600	8.600
1992 JAN	9.600	9.100
1992 MAR	11.200	11.700
1992 MAY	7.000	8.600
1992 JUL	7.800	8.300
1992 SEP	9.000	9.800
1992 NOV	8.500	10.100
COLOUR (HZU)	**DET'N LIMIT = 0.50**	**GUIDELINE = 5 (A3)**
1991 JAN	1.000 <T	BDL
1991 MAR	BDL	BDL
1991 MAY	BDL	BDL
1991 JUL	.500 <T	.500 <T
1991 SEP	.500 <T	.500 <T
1991 NOV	.500 <T	BDL
1992 JAN	.500 <T	BDL
1992 MAR	1.000 <T	.500 <T
1992 MAY	1.000 <T	BDL
1992 JUL	1.000 <T	1.000
1992 SEP	.500 <T	BDL
1992 NOV	BDL	.500 <T
CONDUCTIVITY (UMHO/CM)	**DET'N LIMIT = 1.0**	**GUIDELINE = 400 (F2)**
1991 JAN	227	235
1991 MAR	244	258
1991 MAY	221	231
1991 JUL	231	237
1991 SEP	223	229
1991 NOV	222	227
1992 JAN	227	231
1992 MAR	237	242
1992 MAY	218	227
1992 JUL	226	231
1992 SEP	226	232
1992 NOV	229	236

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
CHEMISTRY (LABORATORY)				
DISS ORG CARBON (MG/L)			DET'N LIMIT = 0.10	GUIDELINE = 5.0 (A3)
1991 JAN	1.700	1.000		
1991 MAR	1.800	1.300		
1991 MAY	1.400	1.000		
1991 JUL	1.600	1.300		
1991 SEP	1.700	1.200		
1991 NOV	1.600	1.200		
1992 JAN	1.400	1.000		
1992 MAR	1.700	1.300		
1992 MAY	1.400	1.300		
1992 JUL	1.600	1.400		
1992 SEP	1.300	1.200		
1992 NOV	1.300	1.200		
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 1.5 (A1)
1991 JAN	.080	.060		
1991 MAR	.080	.060		
1991 MAY	.080	.060		
1991 JUL	.060	.060		
1991 SEP	.080	.080		
1991 NOV	.080	.060		
1992 JAN	.080	.060		
1992 MAR	.100	.100		
1992 MAY	.080	.060		
1992 JUL	.080	.060		
1992 SEP	.080	.080		
1992 NOV	.100	.100		
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)
1991 JAN	104.000	104.600		
1991 MAR	114.000	114.000		
1991 MAY	102.300	102.400		
1991 JUL	107.000	108.000		
1991 SEP	102.300	105.000		
1991 NOV	99.400	99.500		
1992 JAN	97.500	99.600		
1992 MAR	105.000	104.000		
1992 MAY	102.000	103.000		
1992 JUL	102.000	102.000		
1992 SEP	100.300	102.260		
1992 NOV	103.000	105.000		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
CHEMISTRY (LABORATORY)		
IONCAL (DMNSLESS) — DET'N LIMIT = N/A — GUIDELINE = N/A		
1991 JAN	3.228	2.284
1991 MAR	3.758 RID	1.796 RID
1991 MAY	1.080	2.422
1991 JUL	1.752	2.374
1991 SEP	3.013 NAF	1.808 NAF
1991 NOV	.589 NAF	3.647 NAF
1992 JAN	3.249	1.180
1992 MAR	1.049 RID	.932 RID
1992 MAY	.435 NAF	.263 NAF
1992 JUL	.653 NAF	1.947 NAF
1992 SEP	1.102	1.381
1992 NOV	.656	.809
POTASSIUM (MG/L) — DET'N LIMIT = 0.01 — GUIDELINE = 10 (F2)		
1991 JAN	1.050	.950
1991 MAR	1.200	1.100
1991 MAY	1.010	1.010
1991 JUL	.950	.950
1991 SEP	.960	.970
1991 NOV	.970	.960
1992 JAN	.840	.900
1992 MAR	1.170	.970
1992 MAY	.925	.919
1992 JUL	1.040	1.000
1992 SEP	.952	.937
1992 NOV	.959	1.010
LANGELIERS INDEX (DMNSLESS) — DET'N LIMIT = N/A — GUIDELINE = N/A		
1991 JAN	.142	-.114
1991 MAR	.267 RID	-.091 RID
1991 MAY	.163	-.016
1991 JUL	.183	.047
1991 SEP	.258	.141
1991 NOV	.175	.048
1992 JAN	.164	-.082
1992 MAR	.411 RID	.299 RID
1992 MAY	.170	.104
1992 JUL	.312 NAF	.235 NAF
1992 SEP	.236	.082
1992 NOV	.257	.256

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	
CHEMISTRY (LABORATORY)			
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1 GUIDELINE = 30.0 (F2)
1991 JAN	7.700	7.450	
1991 MAR	8.300	8.200	
1991 MAY	7.450	7.550	
1991 JUL	8.100	8.100	
1991 SEP	7.600	7.700	
1991 NOV	7.550	7.500	
1992 JAN	7.350	7.500	
1992 MAR	8.050	7.890	
1992 MAY	7.690	7.590	
1992 JUL	7.650	7.630	
1992 SEP	7.570	7.610	
1992 NOV	7.720	7.750	
SODIUM (MG/L)			DET'N LIMIT = 0.20 GUIDELINE = 200 (A4)
1991 JAN	6.400	6.800	
1991 MAR	6.800	7.000	
1991 MAY	5.000	5.800	
1991 JUL	5.600	6.200	
1991 SEP	5.700	5.600	
1991 NOV	5.900	5.500	
1992 JAN	6.000	6.000	
1992 MAR	6.990	6.870	
1992 MAY	4.450	5.130	
1992 JUL	4.810	4.760	
1992 SEP	5.500	5.740	
1992 NOV	6.030	6.850	
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002 GUIDELINE = 0.05 (F2)
1991 JAN	.010	.008 <T	
1991 MAR	BDL	BDL	
1991 MAY	.006 <T	.002 <T	
1991 JUL	.012	BDL	
1991 SEP	.020	.016	
1991 NOV	.018	.002 <T	
1992 JAN	.010	.004 <T	
1992 MAR	.006 <T	.004 <T	
1992 MAY	.010	.002 <T	
1992 JUL	.020	.004 <T	
1992 SEP	.006 <T	.006 <T	
1992 NOV	.016	.004 <T	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
CHEMISTRY (LABORATORY)		
NITRITE (MG/L)	DET'N LIMIT = 0.001	GUIDELINE = 1.0 (A1)
1991 JAN	.002 <T	BDL
1991 MAR	.002 <T	BDL
1991 MAY	.003 <T	BDL
1991 JUL	.003 <T	BDL
1991 SEP	.003 <T	BDL
1991 NOV	.006	BDL
1992 JAN	.002 <T	.002 <T
1992 MAR	.005	.002 <T
1992 MAY	.004 <T	.001 <T
1992 JUL	.006	BDL
1992 SEP	.005	.003 <T
1992 NOV	.004 <T	BDL
NITRATE (TOTAL) (MG/L)	DET'N LIMIT = 0.005	GUIDELINE = 10.0 (A1)
1991 JAN	.330	.330
1991 MAR	.385	.400
1991 MAY	.375	.360
1991 JUL	.315	.315
1991 SEP	.275	.290
1991 NOV	.290	.290
1992 JAN	.355	.340
1992 MAR	.595	.510
1992 MAY	.410	.415
1992 JUL	.335	.345
1992 SEP	.320	.335
1992 NOV	.325	.345
NITROGEN TOT KJELD (MG/L)	DET'N LIMIT = 0.02	GUIDELINE = N/A
1991 JAN	.160	.150
1991 MAR	.320	.090 <T
1991 MAY	.150	.080 <T
1991 JUL	.290	.090 <T
1991 SEP	.150	.080 <T
1991 NOV	.160	.090 <T
1992 JAN	.170	.140
1992 MAR	.200	.120
1992 MAY	.200	.120
1992 JUL	.150	.110
1992 SEP	.140	.100
1992 NOV	.190	.100

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
CHEMISTRY (LABORATORY)		
PH (DMNSLESS)	DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5 (A4)
1991 JAN	8.170	7.940
1991 MAR	8.220	7.930
1991 MAY	8.180	8.050
1991 JUL	8.190	8.080
1991 SEP	8.270	8.180
1991 NOV	8.220	8.130
1992 JAN	8.220	8.010
1992 MAR	8.440	8.360
1992 MAY	8.200	8.160
1992 JUL	8.340	8.290
1992 SEP	8.280	8.140
1992 NOV	8.280	8.300
PHOSPHORUS FIL REACT (MG/L)	DET'N LIMIT = 0.0005	GUIDELINE = N/A
1991 JAN	.000 <T	BDL
1991 MAR	.006	.000 <T
1991 MAY	.001 <T	.000 <T
1991 JUL	.002	.001 <T
1991 SEP	.001 <T	.001 <T
1991 NOV	.000 <T	.000 <T
1992 JAN	BDL	BDL
1992 MAR	.001 <T	BDL
1992 MAY	BDL	BDL
1992 JUL	BDL	BDL
1992 SEP	BDL	BDL
1992 NOV	BDL	BDL
PHOSPHORUS TOTAL (MG/L)	DET'N LIMIT = 0.002	GUIDELINE = 0.40 (F2)
1991 JAN	.008 <T	.004 <T
1991 MAR	.036	.002 <T
1991 MAY	.006 <T	BDL
1991 JUL	.003 <T	BDL
1991 SEP	.005 <T	BDL
1991 NOV	.004 <T	BDL
1992 JAN	BDL	BDL
1992 MAR	.012	.004 <T
1992 MAY	.008 <T	.004 <T
1992 JUL	.005 <T	BDL
1992 SEP	.006 <T	.005 <T
1992 NOV	.016	.004 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
CHEMISTRY (LABORATORY)		
RESIDUE FILTRATE (MG/L) DET'N LIMIT = N/A GUIDELINE = 500 (A3)		
1991 JAN	148.000 CRO	153.000 CRO
1991 MAR	159.000 CRO	168.000 CRO
1991 MAY	144.000	150.000
1991 JUL	150.000 CRO	154.000 CRO
1991 SEP	145.000 CRO	149.000 CRO
1991 NOV	144.000 CRO	148.000 CRO
1992 JAN	148.000 CRO	150.000 CRO
1992 MAR	154.000 CRO	157.000 CRO
1992 MAY	142.000 CRO	148.000 CRO
1992 JUL	147.000 CRO	150.000 CRO
1992 SEP	147.000 CRO	151.000 CRO
1992 NOV	149.000 CRO	153.000 CRO
SULPHATE (MG/L) DET'N LIMIT = 0.20 GUIDELINE = 500 (A3)		
1991 JAN	16.450	23.790
1991 MAR	18.050	31.880
1991 MAY	16.040	25.280
1991 JUL	16.490	23.640
1991 SEP	16.890	24.690
1991 NOV	16.100	25.180
1992 JAN	16.120	24.010
1992 MAR	17.340	23.170
1992 MAY	16.010	21.790
1992 JUL	16.580	21.610
1992 SEP	16.380	21.860
1992 NOV	16.750	22.380
TURBIDITY (FTU) DET'N LIMIT = 0.05 GUIDELINE = 1.0 (A1)		
1991 JAN	1.820	.470
1991 MAR	38.000	.410
1991 MAY	6.400	.350
1991 JUL	1.900	.210
1991 SEP	5.600	.440
1991 NOV	1.860	.140 <T
1992 JAN	2.600	.250 <T
1992 MAR	5.400	.490
1992 MAY	4.500	.540
1992 JUL	1.490	.240 <T
1992 SEP	4.100	.450
1992 NOV	9.000	.450

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
METALS		
SILVER (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = N/A
22 SAMPLES	BDL	BDL
ALUMINUM (UG/L)	DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
1991 JAN	14.000	41.000
1991 MAR	190.000	38.000
1991 MAY	78.000	50.000
1991 JUL	33.000	220.000
1991 SEP	86.000	200.000
1991 NOV	21.000	110.000
1992 JAN	28.000	60.000
1992 MAR	87.000	120.000
1992 MAY	45.000	110.000
1992 JUL	19.000	180.000
1992 SEP	!SM	!SM
1992 NOV	66.000	99.000
ARSENIC (UG/L)	DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
1991 JAN	.650 <T	.290 <T
1991 MAR	BDL	BDL
1991 MAY	.430 <T	.290 <T
1991 JUL	.610 <T	.330 <T
1991 SEP	.650 <T	.510 <T
1991 NOV	.420 <T	.140 <T
1992 JAN	.860 <T	.530 <T
1992 MAR	.220 <T	BDL
1992 MAY	.430 <T	.340 <T
1992 JUL	.550 <T	.530 <T
1992 SEP	!SM	!SM
1992 NOV	.490 <T	.280 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
METALS		
BARIUM (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
1991 JAN	14.000	13.000
1991 MAR	17.000	14.000
1991 MAY	14.000	13.000
1991 JUL	14.000	14.000
1991 SEP	15.000	14.000
1991 NOV	14.000	14.000
1992 JAN	16.000	15.000
1992 MAR	17.000	15.000
1992 MAY	14.000	15.000
1992 JUL	14.000	14.000
1992 SEP	!SM	!SM
1992 NOV	14.000	14.000
BORON (UG/L)	DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)
1991 JAN	18.000 <T	15.000 <T
1991 MAR	18.000 <T	20.000 <T
1991 MAY	11.000 <T	14.000 <T
1991 JUL	13.000 <T	13.000 <T
1991 SEP	15.000 <T	14.000 <T
1991 NOV	17.000 <T	14.000 <T
1992 JAN	17.000 <T	16.000 <T
1992 MAR	14.000 <T	14.000 <T
1992 MAY	13.000 <T	14.000 <T
1992 JUL	14.000 <T	19.000 <T
1992 SEP	!SM	!SM
1992 NOV	13.000 <T	17.000 <T
BERYLLIUM (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = 6800 (04)
1991 JAN	BDL	BDL
1991 MAR	BDL	BDL
1991 MAY	BDL	BDL
1991 JUL	BDL	BDL
1991 SEP	BDL	BDL
1991 NOV	BDL	BDL
1992 JAN	BDL	BDL
1992 MAR	BDL	BDL
1992 MAY	.060 <T	.060 <T
1992 JUL	BDL	BDL
1992 SEP	!SM	!SM
1992 NOV	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
METALS		
CADMIUM (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = 5.0 (A1)
1991 JAN	BDL	BDL
1991 MAR	.060 <T	BDL
1991 MAY	BDL	BDL
1991 JUL	BDL	BDL
1991 SEP	BDL	BDL
1991 NOV	BDL	BDL
1992 JAN	BDL	BDL
1992 MAR	BDL	BDL
1992 MAY	BDL	BDL
1992 JUL	BDL	BDL
1992 SEP	!SM	!SM
1992 NOV	BDL	BDL
COBALT (UG/L)	DET'N LIMIT = 0.02	GUIDELINE = N/A
1991 JAN	.110 <T	.160 <T
1991 MAR	.250 <T	BDL
1991 MAY	.210 <T	.130 <T
1991 JUL	BDL	BDL
1991 SEP	.180 <T	.090 <T
1991 NOV	.060 <T	.110 <T
1992 JAN	.110 <T	.120 <T
1992 MAR	.230 <T	.170 <T
1992 MAY	.200 <T	.200 <T
1992 JUL	.220 <T	.160 <T
1992 SEP	!SM	!SM
1992 NOV	.130 <T	.060 <T
CHROMIUM (UG/L)	DET'N LIMIT = 0.50	GUIDELINE = 50.0 (A1)
1991 JAN	1.900 <T	1.000 <T
1991 MAR	1.900 <T	1.600 <T
1991 MAY	.740 <T	2.200 <T
1991 JUL	BDL	BDL
1991 SEP	1.100 <T	.770 <T
1991 NOV	.800 <T	BDL
1992 JAN	.840 <T	BDL
1992 MAR	BDL	BDL
1992 MAY	BDL	BDL
1992 JUL	BDL	.990 <T
1992 SEP	!SM	!SM
1992 NOV	.710 <T	2.900 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW		TREATMENT PLANT TREATED	
METALS				
COPPER (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)
1991 JAN	.780	<T	4.500	<T
1991 MAR	1.700	<T	4.000	<T
1991 MAY	.810	<T	3.700	<T
1991 JUL	1.400	<T	3.300	<T
1991 SEP	.900	<T	3.600	<T
1991 NOV	.760	<T	1.800	<T
1992 JAN	1.800	<T	3.700	<T
1992 MAR	1.100	<T	2.100	<T
1992 MAY	1.200	<T	1.900	<T
1992 JUL	1.800	<T	2.200	<T
1992 SEP	!SM		!SM	
1992 NOV	.880	<T	1.400	<T
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)
1991 JAN	17.000	<T	BDL	
1991 MAR	420.000		8.100	<T
1991 MAY	140.000		6.400	<T
1991 JUL	57.000	<T	8.000	<T
1991 SEP	150.000		BDL	
1991 NOV	36.000	<T	BDL	
1992 JAN	55.000	<T	8.700	<T
1992 MAR	120.000		13.000	<T
1992 MAY	77.000		9.600	<T
1992 JUL	33.000	<T	BDL	
1992 SEP	!SM		!SM	
1992 NOV	100.000		BDL	
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1.0 (A1)
1991 JAN	BDL		BDL	
1991 MAR	BDL		BDL	
1991 MAY	BDL		BDL	
1991 JUL	BDL		BDL	
1991 SEP	BDL		BDL	
1991 NOV	BDL		BDL	
1992 JAN	.060	<T	BDL	
1992 MAR	BDL		BDL	
1992 MAY	BDL		BDL	
1992 JUL	BDL		BDL	
1992 SEP	BDL		BDL	
1992 NOV	BDL		BDL	

TABLE 4
ORINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW		TREATMENT PLANT TREATED		
METALS					
MANGANESE (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 50.0 (A3)
1991 JAN	1.200		.490	<T	
1991 MAR	19.000		1.900		
1991 MAY	4.900		.610		
1991 JUL	3.000		.680		
1991 SEP	6.700		.880		
1991 NOV	1.600		.560		
1992 JAN	2.500		.680		
1992 MAR	4.100		1.600		
1992 MAY	3.600		1.200		
1992 JUL	2.000		.850		
1992 SEP	!SM		!SM		
1992 NOV	4.700		1.100		
MOLYBDENUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = N/A
1991 JAN	.480	<T	.510		
1991 MAR	.230	<T	.500	<T	
1991 MAY	.460	<T	.520		
1991 JUL	.470	<T	.530		
1991 SEP	.410	<T	.420	<T	
1991 NOV	.530		.460	<T	
1992 JAN	.510		.560		
1992 MAR	.570		.590		
1992 MAY	.450	<T	.470	<T	
1992 JUL	.460	<T	.380	<T	
1992 SEP	!SM		!SM		
1992 NOV	.360	<T	.480	<T	
NICKEL (UG/L)				DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)
1991 JAN	.720	<T	.930	<T	
1991 MAR	1.800	<T	1.000	<T	
1991 MAY	.780	<T	.400	<T	
1991 JUL	BDL		BDL		
1991 SEP	1.400	<T	.720	<T	
1991 NOV	.500	<T	BDL		
1992 JAN	.510	<T	.440	<T	
1992 MAR	1.300	<T	.970	<T	
1992 MAY	.820	<T	.640	<T	
1992 JUL	.920	<T	.680	<T	
1992 SEP	!SM		!SM		
1992 NOV	BDL		BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	
METALS			
LEAD (UG/L)			DET'N LIMIT = 0.05 GUIDELINE = 10 (A1)
1991 JAN	.080 <T	.110 <T	
1991 MAR	.770	.070 <T	
1991 MAY	.330 <T	.130 <T	
1991 JUL	.140 <T	.110 <T	
1991 SEP	.280 <T	.170 <T	
1991 NOV	.510	.130 <T	
1992 JAN	.250 <T	.080 <T	
1992 MAR	.210 <T	.110 <T	
1992 MAY	.190 <T	.120 <T	
1992 JUL	.090 <T	.310 <T	
1992 SEP	!SM	!SM	
1992 NOV	.200 <T	.080 <T	
ANTIMONY (UG/L)			DET'N LIMIT = 0.05 GUIDELINE = 146 (D4)
1991 JAN	.520	.330 <T	
1991 MAR	.310 <T	.380 <T	
1991 MAY	.490 <T	.440 <T	
1991 JUL	.690	.560	
1991 SEP	.490 <T	.590	
1991 NOV	.590	.780	
1992 JAN	.780	.600	
1992 MAR	.570	.440 <T	
1992 MAY	.390 <T	.310 <T	
1992 JUL	.570	.410 <T	
1992 SEP	!SM	!SM	
1992 NOV	.420 <T	.380 <T	
SELENIUM (UG/L)			DET'N LIMIT = 1.00 GUIDELINE = 10 (A1)
22 SAMPLES	BDL	BDL	

TABLE 4
ORINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
METALS		
STRONTIUM (UG/L)	DET'N LIMIT = 0.10	GUIDELINE = N/A
1991 JAN	95.000	93.000
1991 MAR	110.000	110.000
1991 MAY	96.000	97.000
1991 JUL	99.000	100.000
1991 SEP	100.000	110.000
1991 NOV	97.000	99.000
1992 JAN	110.000	110.000
1992 MAR	110.000	110.000
1992 MAY	98.000	99.000
1992 JUL	110.000	110.000
1992 SEP	!SM	!SM
1992 NOV	98.000	100.000
TITANIUM (UG/L)	DET'N LIMIT = 0.50	GUIDELINE = N/A
1991 JAN	2.500 <T	1.900 <T
1991 MAR	5.300	2.200 <T
1991 MAY	4.100 <T	2.500 <T
1991 JUL	2.500 <T	1.700 <T
1991 SEP	2.300 <T	1.100 <T
1991 NOV	1.700 <T	.820 <T
1992 JAN	1.700 <T	1.300 <T
1992 MAR	4.600 <T	3.600 <T
1992 MAY	6.200	5.500
1992 JUL	4.300 <T	3.800 <T
1992 SEP	!SM	!SM
1992 NOV	2.700 <T	1.100 <T
THALLIUM (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = 13 (D4)
22 SAMPLES	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW		TREATMENT PLANT TREATED		
METALS					
URANIUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)
1991 JAN	.180	<T	.090	<T	
1991 MAR	.250	<T	BDL		
1991 MAY	.230	<T	.070	<T	
1991 JUL	.200	<T	.090	<T	
1991 SEP	.230	<T	.090	<T	
1991 NOV	.170	<T	.070	<T	
1992 JAN	.290	<T	.060	<T	
1992 MAR	.330	<T	.190	<T	
1992 MAY	.220	<T	.160	<T	
1992 JUL	.200	<T	.100	<T	
1992 SEP	!SM		!SM		
1992 NOV	.230	<T	.140	<T	
VANADIUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = N/A
1991 JAN	.140	<T	.090	<T	
1991 MAR	.720		.100	<T	
1991 MAY	BDL		BDL		
1991 JUL	BDL		BDL		
1991 SEP	.510		.190	<T	
1991 NOV	BDL		.120	<T	
1992 JAN	.150	<T	.060	<T	
1992 MAR	.240	<T	BDL		
1992 MAY	.180	<T	.160	<T	
1992 JUL	.160	<T	.380	<T	
1992 SEP	!SM		!SM		
1992 NOV	.260	<T	.350	<T	
ZINC (UG/L)				DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
1991 JAN	1.600	<T	3.800		
1991 MAR	4.400		4.800		
1991 MAY	.530	<T	.890	<T	
1991 JUL	3.200		7.100		
1991 SEP	1.800	<T	2.000	<T	
1991 NOV	2.600		2.900		
1992 JAN	4.800		3.500		
1992 MAR	3.900		1.800	<T	
1992 MAY	3.400		3.600		
1992 JUL	1.900	<T	5.200		
1992 SEP	!SM		!SM		
1992 NOV	.880	<T	1.000	<T	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
CHLOROAROMATICS				
HEXACHLOROBUTADIENE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 450 (D4)
1991 JAN	BDL	BDL		
1991 MAR	2.000 <T	!QU		
1991 MAY	BDL	BDL		
1991 JUL	!AW	!AW		
1991 SEP	!AW	!AW		
1991 NOV	BDL	BDL		
1992 JAN	BDL	BDL		
1992 MAR	BDL	1.000 <T		
1992 MAY	BDL	BDL		
1992 JUL	BDL	BDL		
1992 SEP	BDL	BDL		
1992 NOV	BDL	BDL		
123-TRICHLOROBENZENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
1234-TETCLOROBENZENE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
1235-TETCLOROBENZENE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
124-TRICHLOROBENZENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 10000 (I)
19 SAMPLES	BDL	BDL		
1245-TETCLOROBENZENE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 38000 (D4)
19 SAMPLES	BDL	BDL		
135-TRICHLOROBENZENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
HEXACHLOROBENZENE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 10 (C1)
19 SAMPLES	BDL	BDL		
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 1900 (D4)
19 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
CHLOROAROMATICS				
OCTACHLOROSTYRENE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
PENTACHLOROBENZENE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 74000 (D4)
19 SAMPLES	BDL	BDL		
236-TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
245-TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
26A-TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
CHLOROPHENOLS				
234-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = N/A
5 SAMPLES	BDL	BDL		
2345-TETCHLOROPHENOL (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
5 SAMPLES	BDL	BDL		
2356-TETCHLOROPHENOL (NG/L)			DET'N LIMIT = 10.0	GUIDELINE = N/A
5 SAMPLES	BDL	BDL		
245-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = 2600000 (D4)
5 SAMPLES	BDL	BDL		
246-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 5000 (A1)
1991 MAY	BDL	80.000 <T		
1991 NOV	.	BDL		
1992 MAY	BDL	BDL		
PENTACHLOROPHENOL (NG/L)			DET'N LIMIT = 10.00	GUIDELINE = 60000 (A1)
5 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	
PESTICIDES AND PCB			
ALDRIN (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 700 (A1)
19 SAMPLES	BDL	BDL	
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
1991 JAN	BDL	BDL	
1991 MAR	BDL	!QU	
1991 MAY	BDL	BDL	
1991 JUL	!AW	!AW	
1991 SEP	!AW	!AW	
1991 NOV	1.000 <T	BDL	
1992 JAN	BDL	BDL	
1992 MAR	BDL	BDL	
1992 MAY	1.000 <T	BDL	
1992 JUL	1.000 <T	1.000 <T	
1992 SEP	BDL	1.000 <T	
1992 NOV	1.000 <T	BDL	
BETA BHC (NG/L)		DET'N LIMIT = 1.00	GUIDELINE = 300 (G)
19 SAMPLES	BDL	BDL	
LINDANE (GAMMA BHC) (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)
19 SAMPLES	BDL	BDL	
ALPHA CHLORDANE (NG/L)		DET'N LIMIT = 2.000	GUIDELINE = 7000 (A1)
19 SAMPLES	BDL	BDL	
GAMMA CHLORDANE (NG/L)		DET'N LIMIT = 2.00	GUIDELINE = 7000 (A1)
19 SAMPLES	BDL	BDL	
DIELDRIN (NG/L)		DET'N LIMIT = 2.00	GUIDELINE = 700 (A1)
19 SAMPLES	BDL	BDL	
METHOXYCHLOR (NG/L)		DET'N LIMIT = 5.0	GUIDELINE = 900000 (A1)
19 SAMPLES	BDL	BDL	
ENDOSULFAN 1 (NG/L)		DET'N LIMIT = 2.00	GUIDELINE = 74000 (D4)
19 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
PESTICIDES AND PCB				
ENDOSULFAN II (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 74000 (D4)
19 SAMPLES	BDL	BDL		
ENDRIN (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 1600 (D3)
19 SAMPLES	BDL	BDL		
ENDOSULFAN SULPHATE (NG/L)			DET'N LIMIT = 5.00	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
HEPTACHLOR EPOXIDE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 3000 (A1)
11 SAMPLES	BDL	BDL		
HEPTACHLOR (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 3000 (A1)
19 SAMPLES	BDL	BDL		
MIREX (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
OXYCHLORDANE (NG/L)			DET'N LIMIT = 2.000	GUIDELINE = N/A
19 SAMPLES	BDL	BDL		
O,P-DDT (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 30000 (A1)
19 SAMPLES	BDL	BDL		
PCB (NG/L)			DET'N LIMIT = 20.00	GUIDELINE = 3000 (A2)
19 SAMPLES	BDL	BDL		
P,P-DDD (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 30000 (A1)
19 SAMPLES	BDL	BDL		
P,P-DDE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 30000 (A1)
19 SAMPLES	BDL	BDL		
P,P-DDT (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 30000 (A1)
19 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
PESTICIDES AND PCB				
TOXAPHENE (NG/L)			DET'N LIMIT = 500.0	GUIDELINE = 5000 (A1)
15 SAMPLES	BDL	BDL		
AMETRINE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 300000 (D3)
22 SAMPLES	BDL	BDL		
ATRAZINE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 60000 (A2)
1991 JAN	BDL	BDL		
1991 MAR	BDL	BDL		
1991 MAY	BDL	BDL		
1991 JUL	BDL	BDL		
1991 SEP	!AW	!AW		
1991 NOV	BDL	BDL		
1992 JAN	BDL	BDL		
1992 MAR	70.000 <T	BDL		
1992 MAY	BDL	BDL		
1992 JUL	BDL	BDL		
1992 SEP	BDL	BDL		
1992 NOV	BDL	BDL		
ATRATONE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = N/A
22 SAMPLES	BDL	BDL		
CYANAZINE (BLADEX) (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = 10000 (A2)
22 SAMPLES	BDL	BDL		
DESETHYL ATRAZINE (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 60000 (A2)
22 SAMPLES	BDL	BDL		
DESETHYL SIMAZINE (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 10000 (A2)
22 SAMPLES	BDL	BDL		
PROMETONE (NG/L)			DET'N LIMIT = 50.000	GUIDELINE = 52500 (D3)
22 SAMPLES	BDL	BDL		
PROPAZINE (NG/L)			DET'N LIMIT = 50.000	GUIDELINE = 700000 (D3)
22 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	
PESTICIDES AND PCB			
PROMETRYNE (NG/L)			DET'N LIMIT = 50.000 GUIDELINE = 1000 (A2)
22 SAMPLES	BDL	BDL	
METRIBUZIN (SENCOR) (NG/L)			DET'N LIMIT = 100.0 GUIDELINE = 80000 (A1)
22 SAMPLES	BDL	BDL	
SIMAZINE (NG/L)			DET'N LIMIT = 50.00 GUIDELINE = 10000 (A2)
22 SAMPLES	BDL	BDL	
ALACHLOR (LASSO) (NG/L)			DET'N LIMIT = 500.0 GUIDELINE = 5000 (A2)
22 SAMPLES	BDL	BDL	
METOLACHLOR (NG/L)			DET'N LIMIT = 500.0 GUIDELINE = 50000 (A2)
22 SAMPLES	BDL	BDL	
HEXACLCYCLOPENTADIEN (NG/L)			DET'N LIMIT = 5.00 GUIDELINE = 206000 (D4)
1991 JAN	BDL	BDL	
1991 MAR	BDL	!QU	
1991 MAY	BDL	BDL	
1991 JUL	!AW	!AW	
1991 SEP	!AW	!AW	
1991 NOV	BDL	36.000 <T	
1992 JAN	BDL	16.000 <T	
1992 MAR	BDL	!QU	
1992 MAY	!QU	!QU	
1992 JUL	!QU	!QU	
1992 SEP	!QU	!QU	
1992 NOV	!QU	!QU	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

PHENOLICS (UG/L) DET'N LIMIT = 0.2 GUIDELINE = N/A

	TREATMENT PLANT RAW PHENOLICS	TREATMENT PLANT TREATED PHENOLICS
1991 JAN	BDL	BDL
1991 MAR	.600 <T	.200 <T
1991 MAY	BDL	.400 <T
1991 JUL	BDL	BDL
1991 SEP	.400 <T	.600 <T
1991 NOV	BDL	BDL
1992 JAN	BDL	BDL
1992 MAR	BDL	.400 <T
1992 MAY	BDL	BDL
1992 JUL	BDL	.600 <T
1992 SEP	BDL	.400 <T
1992 NOV	BDL	.600 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
POLYAROMATIC HYDROCARBONS				
PHENANTHRENE (NG/L)			DET'N LIMIT = 10.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
ANTHRACENE (NG/L)			DET'N LIMIT = 1.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
FLUORANTHENE (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 42000 (D4)
9 SAMPLES	BDL	BDL		
PYRENE (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
BENZO(A)ANTHRACENE (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
CHRYSENE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
DIMETH. BENZ(A)ANTHR (NG/L)			DET'N LIMIT = 5.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
BENZO(E) PYRENE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
BENZO(B) FLUORANTHEN (NG/L)			DET'N LIMIT = 10.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
PERYLENE (NG/L)			DET'N LIMIT = 10.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
BENZO(K) FLUORANTHEN (NG/L)			DET'N LIMIT = 1.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
BENZO(A) PYRENE (NG/L)			DET'N LIMIT = 5.0	GUIDELINE = 10 (A1)
9 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
POLYAROMATIC HYDROCARBONS				
BENZO(G,H,I) PERYLEN (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
DIBENZO(A,H) ANTHRAC (NG/L)			DET'N LIMIT = 10.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
INDENO(1,2,3-C,D) PY (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
BENZO(B) CHRYSENE (NG/L)			DET'N LIMIT = 2.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		
CORONENE (NG/L)			DET'N LIMIT = 10.0	GUIDELINE = N/A
9 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
SPECIFIC PESTICIDES				
TOXAPHENE (NG/L)			DET'N LIMIT = 500.0	GUIDELINE = 5000 (A1)
3 SAMPLES	BDL	BDL		
2,4,5-T (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 280000 (A1)
5 SAMPLES	BDL	BDL		
2,4-D (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = 100000 (A1)
5 SAMPLES	BDL	BDL		
2,4-DB (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = N/A
5 SAMPLES	BDL	BDL		
2,4 D PROPIONIC ACID (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = N/A
5 SAMPLES	BDL	BDL		
DICAMBA (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 120000 (A1)
5 SAMPLES	BDL	BDL		
2,4,5-TP (SILVEX) (NG/L)			DET'N LIMIT = 20.00	GUIDELINE = 10000 (A1)
5 SAMPLES	BDL	BDL		
DIAZINON (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 20000 (A1)
4 SAMPLES	BDL	BDL		
DICHLOROVOS (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
4 SAMPLES	BDL	BDL		
CHLORPYRIFOS (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
4 SAMPLES	BDL	BDL		
ETHION (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 35000 (G)
4 SAMPLES	BDL	BDL		
MALATHION (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 190000 (A1)
4 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
SPECIFIC PESTICIDES				
MEVINPHOS (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
4 SAMPLES	BDL	BDL		
METHYL PARATHION (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 9000 (D3)
4 SAMPLES	BDL	BDL		
METHYLTRITHION (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
4 SAMPLES	BDL	BDL		
PARATHION (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 50000 (A1)
4 SAMPLES	BDL	BDL		
PHORATE (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 2000 (A2)
4 SAMPLES	BDL	BDL		
RELDAN (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
4 SAMPLES	BDL	BDL		
RONNEL (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
4 SAMPLES	BDL	BDL		
CARBOFURAN (NG/L)			DET'N LIMIT = 2000.0	GUIDELINE = 90000 (A1)
5 SAMPLES	BDL	BDL		
CHLORPROPHAM (CIPC) (NG/L)			DET'N LIMIT = 2000.0	GUIDELINE = 350000 (G)
5 SAMPLES	BDL	BDL		
DIALLATE (NG/L)			DET'N LIMIT = 2000.0	GUIDELINE = N/A
5 SAMPLES	BDL	BDL		
EPTAM (NG/L)			DET'N LIMIT = 2000.0	GUIDELINE = N/A
5 SAMPLES	BDL	BDL		
IPC (NG/L)			DET'N LIMIT = 2000.0	GUIDELINE = N/A
5 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
SPECIFIC PESTICIDES				
PROPOXUR (NG/L)			DET'N LIMIT = 2000.0	GUIDELINE = 140000 (D3)
5 SAMPLES	BDL	BDL		
CARBARYL (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 90000 (A1)
5 SAMPLES	BDL	BDL		
BUTYLATE (NG/L)			DET'N LIMIT = 2000.0	GUIDELINE = 245000 (D3)
5 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
VOLATILES		
BENZENE (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
1991 JAN	.150 <T	.150 <T
1991 MAR	BDL	BDL
1991 MAY	BDL	BDL
1991 JUL	BDL	.050 <T
1991 SEP	BDL	BDL
1991 NOV	BDL	.100 <T
1992 JAN	BDL	.050 <T
1992 MAR	BDL	.050 <T
1992 MAY	BDL	BDL
1992 JUL	BDL	BDL
1992 SEP	BDL	.050 <T
1992 NOV	BDL	BDL
TOLUENE (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)
1991 JAN	.100 <T	.450 <T
1991 MAR	BDL	.100 <T
1991 MAY	BDL	.100 <T
1991 JUL	BDL	.150 <T
1991 SEP	BDL	.100 <T
1991 NOV	.100 <T	.550
1992 JAN	BDL	BDL
1992 MAR	BDL	.100 <T
1992 MAY	BDL	.050 <T
1992 JUL	.050 <T	.100 <T
1992 SEP	BDL	.100 <T
1992 NOV	BDL	BDL
ETHYLBENZENE (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
1991 JAN	BDL	.150 <T
1991 MAR	BDL	BDL
1991 MAY	BDL	.100 <T
1991 JUL	BDL	.100 <T
1991 SEP	BDL	.100 <T
1991 NOV	.050 <T	.150 <T
1992 JAN	BDL	.100 <T
1992 MAR	BDL	BDL
1992 MAY	BDL	.100 <T
1992 JUL	.100 <T	.100 <T
1992 SEP	BDL	.100 <T
1992 NOV	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	
VOLATILES			
P-XYLENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
1991 JAN	BDL	BDL	
1991 MAR	BDL	BDL	
1991 MAY	BDL	BDL	
1991 JUL	BDL	BDL	
1991 SEP	BDL	BDL	
1991 NOV	BDL	BDL	
1992 JAN	BDL	BDL	
1992 MAR	BDL	BDL	
1992 MAY	BDL	BDL	
1992 JUL	BDL	BDL	
1992 SEP	BDL	.100 <T	
1992 NOV	BDL	BDL	
M-XYLENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
1991 JAN	BDL	.200 <T	
1991 MAR	BDL	BDL	
1991 MAY	BDL	.300 <T	
1991 JUL	BDL	BDL	
1991 SEP	BDL	BDL	
1991 NOV	BDL	.300 <T	
1992 JAN	BDL	BDL	
1992 MAR	BDL	BDL	
1992 MAY	BDL	BDL	
1992 JUL	BDL	BDL	
1992 SEP	BDL	BDL	
1992 NOV	BDL	BDL	
O-XYLENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)
1991 JAN	BDL	.100 <T	
1991 MAR	BDL	BDL	
1991 MAY	BDL	.150 <T	
1991 JUL	BDL	BDL	
1991 SEP	BDL	BDL	
1991 NOV	BDL	.150 <T	
1992 JAN	BDL	BDL	
1992 MAR	BDL	BDL	
1992 MAY	BDL	BDL	
1992 JUL	BDL	BDL	
1992 SEP	BDL	BDL	
1992 NOV	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED
VOLATILES		
STYRENE (UG/L)	DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)
1991 JAN	BDL	BDL
1991 MAR	BDL	BDL
1991 MAY	BDL	BDL
1991 JUL	BDL	BDL
1991 SEP	BDL	BDL
1991 NOV	.150 <T	BDL
1992 JAN	BDL	BDL
1992 MAR	BDL	BDL
1992 MAY	BDL	BDL
1992 JUL	.100 <T	BDL
1992 SEP	BDL	BDL
1992 NOV	BDL	BDL
1,1-DICHLOROETHYLENE (UG/L)	DET'N LIMIT = 0.100	GUIDELINE = 7 (D1)
24 SAMPLES	BDL	BDL
METHYLENE CHLORIDE (UG/L)	DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)
24 SAMPLES	BDL	BDL
T12-DICHLOROETHYLENE (UG/L)	DET'N LIMIT = 0.10	GUIDELINE = 70 (D1)
24 SAMPLES	BDL	BDL
1,1-DICHLOROETHANE (UG/L)	DET'N LIMIT = 0.100	GUIDELINE = N/A
24 SAMPLES	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	
VOLATILES			
CHLOROFORM (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
1991 JAN	BDL	11.500	
1991 MAR	BDL	10.500	
1991 MAY	BDL	16.200	
1991 JUL	BDL	15.000	
1991 SEP	BDL	40.200	
1991 NOV	BDL	9.400	
1992 JAN	BDL	10.200	
1992 MAR	BDL	13.500	
1992 MAY	BDL	13.100	
1992 JUL	BDL	17.100	
1992 SEP	BDL	22.500	
1992 NOV	BDL	16.600	
111,TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)
1991 JAN	BDL	BDL	
1991 MAR	.040 <T	BDL	
1991 MAY	BDL	BDL	
1991 JUL	BDL	BDL	
1991 SEP	BDL	BDL	
1991 NOV	BDL	BDL	
1992 JAN	BDL	BDL	
1992 MAR	BDL	BDL	
1992 MAY	BDL	BDL	
1992 JUL	BDL	BDL	
1992 SEP	BDL	BDL	
1992 NOV	BDL	BDL	
1,2 DICHLOROETHANE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
1991 JAN	BDL	BDL	
1991 MAR	BDL	BDL	
1991 MAY	BDL	BDL	
1991 JUL	BDL	BDL	
1991 SEP	BDL	BDL	
1991 NOV	BDL	BDL	
1992 JAN	BDL	.100 <T	
1992 MAR	BDL	BDL	
1992 MAY	BDL	BDL	
1992 JUL	BDL	BDL	
1992 SEP	BDL	BDL	
1992 NOV	BDL	BDL	
CARBON TETRACHLORIDE (UG/L)		DET'N LIMIT = 0.20	GUIDELINE = 5 (A1)
24 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	
VOLATILES			
1,2-DICHLOROPROPANE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)
24 SAMPLES	BDL	BDL	
TRICHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 50 (A1)
24 SAMPLES	BDL	BDL	
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)
1991 JAN	BDL	10.550	
1991 MAR	BDL	7.350	
1991 MAY	BDL	8.050	
1991 JUL	BDL	8.450	
1991 SEP	BDL	11.500	
1991 NOV	BDL	8.900	
1992 JAN	BDL	BDL	
1992 MAR	BDL	12.600	
1992 MAY	BDL	8.100	
1992 JUL	BDL	11.000	
1992 SEP	BDL	10.800	
1992 NOV	BDL	10.900	
112-TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 0.6 (D4)
24 SAMPLES	BDL	BDL	
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
1991 JAN	BDL	6.800	
1991 MAR	BDL	3.200	
1991 MAY	BDL	3.900	
1991 JUL	BDL	4.100	
1991 SEP	BDL	4.800	
1991 NOV	BDL	6.200	
1992 JAN	BDL	3.500	
1992 MAR	BDL	10.600	
1992 MAY	BDL	3.900	
1992 JUL	BDL	5.700	
1992 SEP	BDL	4.700	
1992 NOV	BDL	6.200	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	
VOLATILES			
TETRACHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 65 (A5)
1991 JAN	.050 <T	.050 <T	
1991 MAR	BDL	BDL	
1991 MAY	BDL	BDL	
1991 JUL	BDL	BDL	
1991 SEP	BDL	BDL	
1991 NOV	BDL	BDL	
1992 JAN	BDL	BDL	
1992 MAR	BDL	BDL	
1992 MAY	BDL	BDL	
1992 JUL	BDL	BDL	
1992 SEP	BDL	BDL	
1992 NOV	BDL	BDL	
BROMOFORM (UG/L)		DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)
1991 JAN	BDL	.600 <T	
1991 MAR	BDL	.200 <T	
1991 MAY	BDL	.400 <T	
1991 JUL	BDL	BDL	
1991 SEP	BDL	.400 <T	
1991 NOV	BDL	.800 <T	
1992 JAN	BDL	BDL	
1992 MAR	BDL	1.800 <T	
1992 MAY	BDL	BDL	
1992 JUL	BDL	BDL	
1992 SEP	BDL	BDL	
1992 NOV	BDL	BDL	
1122-TETCHLOROETHANE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 0.17 (D4)
24 SAMPLES	BDL	BDL	
VINYL CHLORIDE (UG/L)		DET'N LIMIT = 0.100	GUIDELINE = 2 (D1)
10 SAMPLES	BDL	BDL	
C12-DICHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.100	GUIDELINE = 70 (D1)
10 SAMPLES	BDL	BDL	
CHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 1510 (D3)
24 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
VOLATILES				
1,4-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 5 (A1)
24 SAMPLES	BDL	BDL		
1,3-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 3750 (D3)
24 SAMPLES	BDL	BDL		
1,2-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 200 (A1)
24 SAMPLES	BDL	BDL		
ETHYLENE DIBROMIDE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (D1)
24 SAMPLES	BDL	BDL		
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)
1991 JAN	BDL	29.400		
1991 MAR	BDL	21.350		
1991 MAY	BDL	28.600		
1991 JUL	BDL	27.550		
1991 SEP	BDL	56.500		
1991 NOV	BDL	25.300		
1992 JAN	BDL	13.700		
1992 MAR	BDL	38.500		
1992 MAY	BDL	25.100		
1992 JUL	BDL	33.800		
1992 SEP	BDL	38.000		
1992 NOV	BDL	33.700		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 WALPOLE ISLAND WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED		
RADIONUCLIDES				
COBALT 60 (BQ/L)			DET'N LIMIT = 0.70	GUIDELINE = N/A
6 SAMPLES	BDL	BDL		
CESIUM 134 (BQ/L)			DET'N LIMIT = 0.70	GUIDELINE = N/A
6 SAMPLES	BDL	BDL		
CESIUM 137 (BQ/L)			DET'N LIMIT = 0.70	GUIDELINE = 50 (A1)
6 SAMPLES	BDL	BDL		
GROSS ALPHA COUNT (BQ/L)			DET'N LIMIT = 0.04	GUIDELINE = 0.55 (D1)
6 SAMPLES	BDL	BDL		
GROSS BETA COUNT (BQ/L)			DET'N LIMIT = 0.04	GUIDELINE = N/A
1991 JUL	.070	.080		
1991 SEP	.070	.070		
1992 JUL	.070	.060		
TRITIUM (BQ/L)			DET'N LIMIT = 7.00	GUIDELINE = 40000 (A1)
1991 JUL	BDL	15.000		
1991 SEP	BDL	BDL		
1992 JUL	8.000	BDL		
IODINE 131 (BQ/L)			DET'N LIMIT = 0.70	GUIDELINE = 10 (A1)
6 SAMPLES	BDL	BDL		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
BACTERIOLOGICAL				
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0	(A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML	(A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A	
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML	(A1)
CHEMISTRY (FLD)				
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD PH	DMNSLESS	N/A	6.5-8.5	(A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0	(A3)
FIELD TURBIDITY	FTU	N/A	1.0	(A1)
CHEMISTRY (LAB)				
ALKALINITY	MG/L	0.20	30-500	(A4)
AMMONIUM TOTAL	MG/L	0.002	0.05	(F2)
CALCIUM	MG/L	0.20	100.0	(F2)
CHLORIDE	MG/L	0.20	250.0	(A3)
COLOUR	TCU	0.50	5.0	(A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0	(F2)
CYANIDE	MG/L	0.001	0.2	(A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0	(A3)
FLUORIDE	MG/L	0.01	1.5*	(A1)
HARDNESS	MG/L	0.50	80-100	(A4)
IONCAL	DMNSLESS	N/A	N/A	
LANGELIERS INDEX	DMNSLESS	N/A	N/A	
MAGNESIUM	MG/L	0.10	30.0	(F2)
NITRATES (TOTAL)	MG/L	0.005	10.0	(A1)
NITRITE	MG/L	0.001	1.0	(A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A	
PH	DMNSLESS	N/A	6.5-8.5	(A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A	
PHOSPHORUS TOTAL	MG/L	0.002	0.4	(F2)
POTASSIUM	MG/L	0.010	10.0	(F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0	(A3)
SODIUM	MG/L	0.20	200.0	(A4)
SULPHATE	MG/L	0.20	500.0	(A4)
TURBIDITY	FTU	0.05	1.0	(A1)

* The Maximum Acceptable Concentration (MAC) for <u>naturally occurring fluoride</u> in drinking water is 2.4 mg/L.

CHLOROAROMATICS				
1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A	
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A	
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A	
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000	(I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000	(D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A	
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A	
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A	
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A	
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10	(C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450	(D4)
HEXACHLOROETHANE	NG/L	1.0	1900	(D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A	
PENTACHLOROBENZENE	NG/L	1.0	74000	(D4)
CHLOROPHENOLS				
2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A	
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A	
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000	(D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000	(A1)
PENTACHLOROPHENOL	NG/L	10.0	60000	(A1)
METALS				
ALUMINUM	UG/L	0.10	100	(A4)
ANTIMONY	UG/L	0.05	146	(D4)
ARSENIC	UG/L	0.10	25	(A1)
BARIUM	UG/L	0.05	1000	(A2)
BERYLLIUM	UG/L	0.05	6800	(D4)
BORON	UG/L	2.00	5000	(A1)
CADMIUM	UG/L	0.05	5	(A1)
CHROMIUM	UG/L	0.50	50	(A1)
COBALT	UG/L	0.02	N/A	
COPPER	UG/L	0.50	1000	(A3)
IRON	UG/L	6.00	300	(A3)
LEAD	UG/L	0.05	10	(A1)
MANGANESE	UG/L	0.05	50	(A3)
MERCURY	UG/L	0.02	1	(A1)
MOLYBDENUM	UG/L	0.05	N/A	
NICKEL	UG/L	0.20	350	(D3)
SELENIUM	UG/L	1.00	10	(A1)
SILVER	UG/L	0.05	N/A	
STRONTIUM	UG/L	0.10	N/A	
THALLIUM	UG/L	0.05	13	(D4)
TITANIUM	UG/L	0.50	N/A	
URANIUM	UG/L	0.05	100	(A1)
VANADIUM	UG/L	0.05	N/A	
ZINC	UG/L	0.20	5000	(A3)
POLYNUCLEAR AROMATIC HYDROCARBONS				
ANTHRACENE	NG/L	1.0	N/A	
BENZO(A) ANTHRACENE	NG/L	20.0	N/A	
BENZO(A) PYRENE	NG/L	5.0	10	(A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A	
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A	
BENZO(E) PYRENE	NG/L	50.0	N/A	
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A	
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A	
CHRYSENE	NG/L	50.0	N/A	
CORONENE	NG/L	10.0	N/A	
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A	
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A	
FLUORANTHENE	NG/L	20.0	42000	(D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A	
PERYLENE	NG/L	10.0	N/A	
PHENANTHRENE	NG/L	10.0	N/A	
PYRENE	NG/L	20.0	N/A	
PESTICIDES & PCB				
ALACHLOR (LASSO)	NG/L	500.0	5000	(A2)
ALDRIN	NG/L	1.0	700	(A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700	(G)
ALPHA CHLORDANE	NG/L	2.0	7000	(A1)
AMETRINE	NG/L	50.0	300000	(D3)
ATRATONE	NG/L	50.0	N/A	
ATRAZINE	NG/L	50.0	60000	(A2)
DESETHYL ATRAZINE	NG/L	200.0	60000	(A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300	(G)
CYANAZINE (BLADEX)	NG/L	100.0	10000	(A2)
DIELDRIN	NG/L	2.0	700	(A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000	(D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000	(D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
ENDRIN	NG/L	5.0	1600	(D3)
GAMMA CHLORDANE	NG/L	2.0	7000	(A1)
HEPTACHLOR	NG/L	1.0	3000	(A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000	(A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000	(D4)
LINDANE (GAMMA BHC)	NG/L	1.0	4000	(A1)
METHOXYCHLOR	NG/L	5.0	900000	(A1)
METOLACHLOR	NG/L	500.0	50000	(A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000	(A1)
MIREX	NG/L	5.0	N/A	
P,P-DDD	NG/L	5.0	30000	(A1)
O,P-DDT	NG/L	5.0	30000	(A1)
P,P-DDT	NG/L	5.0	30000	(A1)
P,P-DDE	NG/L	1.0	30000	(A1)
OXYCHLORDANE	NG/L	2.0	N/A	
PCB	NG/L	20.0	3000	(A2)
PROMETONE	NG/L	50.0	52500	(D3)
PROMETRYNE	NG/L	50.0	1000	(A2)
PROPAZINE	NG/L	50.0	700000	(D3)
SIMAZINE	NG/L	50.0	10000	(A2)
DESETHYL SIMAZINE	NG/L	200.0	10000	(A2)
TOXAPHENE	NG/L	500.0	5000	(A1)
PHENOLICS				
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A	
SPECIFIC PESTICIDES				
2,4 D PROPIONIC ACID	NG/L	100.0	N/A	
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.0	280000	(A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000	(A1)
2,4-DICHLORORPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A	
2,4,5-TP (SILVEX)	NG/L	20.0	10000	(A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000	(D3)
CARBARYL (SEVIN)	NG/L	200.0	90000	(A1)
CARBOFURAN	NG/L	2000.0	90000	(A1)
CHLORPROPHAM (CIPC)	NG/L	2000.0	350000	(G)
CHLORPYRIFOS (DURSBAN)	NG/L	20.0	N/A	
DIALLATE	NG/L	2000.0	N/A	
DIAZINON	NG/L	20.0	20000	(A1)
DICAMBA	NG/L	50.0	120000	(A1)
DICHLOROVOS	NG/L	20.0	N/A	
EPTAM	NG/L	2000.0	N/A	
ETHION	NG/L	20.0	35000	(G)
IPC	NG/L	2000.0	N/A	
MALATHION	NG/L	20.0	190000	(A1)
METHYL PARATHION	NG/L	50.0	9000	(D3)
METHYLTRITHION	NG/L	20.0	N/A	
MEVINPHOS	NG/L	20.0	N/A	
PARATHION	NG/L	20.0	50000	(A1)
PHORATE (THIMET)	NG/L	20.0	2000	(A2)
PICHLORAM	NG/L	100.0	190000	(A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000	(D3)
RELDAN	NG/L	20.0	N/A	
RONNEL	NG/L	20.0	N/A	
VOLATILES				
1,1-DICHLOROETHANE	UG/L	0.10	N/A	
1,1-DICHLOROETHYLENE	UG/L	0.10	7	(D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200	(A1)
1,2-DICHLOROETHANE	UG/L	0.05	5	(A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5	(D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750	(D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5	(A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200	(D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6	(D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17	(D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
BENZENE	UG/L	0.05	5	(A1)
BROMOFORM	UG/L	0.20	350	(A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5	(A1)
CHLOROBENZENE	UG/L	0.10	1510	(D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350	(A1+)
CHLOROFORM	UG/L	0.10	350	(A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70	(D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350	(A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50	(D1)
ETHYLBENZENE	UG/L	0.05	2.4	(A3)
M-XYLENE	UG/L	0.10	300	(A3*)
METHYLENE CHLORIDE	UG/L	0.50	50	(A1)
O-XYLENE	UG/L	0.05	300	(A3*)
P-XYLENE	UG/L	0.10	300	(A3*)
STYRENE	UG/L	0.05	100	(D1)
TETRACHLOROETHYLENE	UG/L	0.05	65	(A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70	(D1)
TOLUENE	UG/L	0.05	24	(A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350	(A1)
TRICHLOROETHYLENE	UG/L	0.10	50	(A1)
VINYL CHLORIDE	UG/L	0.10	2	(D1)
RADIONUCLIDES				
TRITIUM	BQ/L	7.0	40000	(A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55#	(D1)
GROSS BETA COUNT	BQ/L	0.04	N/A	
COBALT 60	BQ/L	0.70	N/A	
CESIUM 134	BQ/L	0.70	N/A	
CESIUM 137	BQ/L	0.70	50	(A1)
IODINE 131	BQ/L	0.70	10	(A1)

Equal to 15.0 Picocuries/litre

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY
All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS
Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS
Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME
Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION
This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME:	BENZENE
CAS#:	71-43-2
MOLECULAR FORMULAE:	C_6H_6
DETECTION LIMIT:	(FOR METHOD POCODO) 0.05 µg/L
SYNONYMS:	BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27) CYCLOHEXATRIENE (41)
CHARACTERISTICS:	COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30)
PROPERTIES:	SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41) THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER THRESHOLD TASTE: 0.5 mg/L IN WATER (39) ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80)
SOURCES:	COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST. ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.
USES:	DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.
REMOVAL:	THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION
ADDITIONAL PROPERTIES:	MOLECULAR WEIGHT: 78.12 MELTING POINT: 5.5°C (27) BOILING POINT: 80.1°C (27) SPECIFIC GRAVITY: 0.8790 AT 20°C (27) VAPOUR PRESSURE: 100 MM AT 26.1°C (27) HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41) LOG OCT./WATER PARTITON COEFFICIENT: 1.95 TO 2.13 (39) CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41) SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP),(PEOP),(PECAR)	-as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)

Phenols	-250 mL glass bottle -do not rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do not rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year) (PBVOL),(PBEXT)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do not rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.
6. No smoking in area of sample location.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.

6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.